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till I shall be able to complete an exhibition of the group, now far advanced, which will not, indeed, be exhaustive, but will be so thorough as to afford a solid foundation for future work. Additional specimens will be welcome even if they lengthen the task, but increase of material in some cases eases the work rather than adds to it.

EDWARD S. STEELE

WASHINGTON, D. C.

## REVIEWS

### THREE PUBLICATIONS ON HEREDITY

#### **Genetics\***

This volume aims to introduce the average reader to the various problems in the study of heredity. The chapter headings are as follows: I. Introduction; II. The Carriers of the Heritage; III. Variation; IV. Mutation; V. The Inheritance of Acquired Characters; VI. The Pure Line; VII. Segregation and Dominance; VIII. Reversion to Old Types and the Making of New Ones; IX. Blending Inheritance; X. The Determination of Sex; XI. The Application to Man; and XII. Human Conservation.

It is a difficult task to summarize for the ordinary reader the various lines of thought and investigation covered by these topics. Too often a popular treatise on a scientific subject falls into the error of presenting as clear cut facts, results and conclusions not fully established. The general reader is not likely to consider these with a critical mind and too often accepts mere views and partly established facts as fundamental principles. There is, in other words, an air of finality that does not stimulate the best thought in the mind of the reader. This volume on genetics is not entirely free from this defect. In general, however, the author has made clear statements of the problems under consideration, of the evidence at hand bearing on them, and of the field for future investigation. In the chapters on Variation, Mutation, Inheritance of Acquired Characters, The Pure Line and Human Conservation, the author is at his best, at least in this respect.

\* By Herbert Eugene Walter, assistant professor of biology at Brown University. Pages i-xiv + 1-272. [Illust.] Published February, 1913, by The Macmillan Company. Price \$1.50 net.

In discussing Segregation and Dominance, Old Types and New, and Blending Inheritance, the author is fully committed to the Mendelian interpretation. Characters are treated as independent units which "segregate out as if independent of each other," and the factor hypothesis is given for its full assumed value in the explanation of heredity. The assumption of an increased number of "duplicate determiners" which explain all phenomena of blending inheritance is given as "strictly cases of Mendelian dominance and segregation."

It would seem that even a popular book of this sort should present the facts concerning incomplete segregation, the evidence for the modification of the so-called unit-characters by selection and the various difficulties and inadequacies of the Mendelian notation. Aside from this, the selection of experimental data is well made and is representative of the lines of the experimental research of the past decade.

There is at present no other book that attempts to cover in a semi-popular way so much that pertains to heredity. The volume is an introduction to the study of heredity presented from what may be called the Mendelian viewpoint.

A. B. STOUT

"Heredity of a Maize Variation" is the title of Bulletin No. 272 written by G. N. Collins and issued in January by the Bureau of Plant Industry of the United States Department of Agriculture.

This paper reports the appearance of a single white ear of maize as an "albinistic mutation" in a strain of pure yellow corn and gives an account of various studies on the heredity of this ear. Three xenia generations were secured by self fertilization, and crosses between certain of these and two types of white corn are reported. In all of these the endosperm characters were studied and the results tabulated and expressed in ratios.

The results viewed in a general way give a fair agreement with the ratios of Mendelian expectation, but upon more careful analysis the author finds that in certain cases either a monohybrid or a dihybrid ratio might apply, depending on the grade of classification.

The pure bred progenies of this albino ear gave seeds that were dark yellow, light yellow, very light yellow, and white. Most of the seeds showed at least some trace of yellow, and apparently pure white seeds, from an ear bearing these classes, produced under further self fertilization, seeds with the yellow endosperm fully developed. The author points out that the segregation is incomplete, that the dominant character is not absent from certain of the recessives and that the "results appear as evidence against the idea of gametic purity and alternative inheritance."

A. B. STOUT

Recent Reports on the "Qualitative Studies of Inheritance in *Nicotiana* Hybrids"\* by Dr. T. H. Goodspeed are especially interesting on account of the results obtained and the interpretation which is given to them.

One phase of the investigation pertains to the relation between the weight of hybrid tobacco seed and the inheritance of characters in the  $F_2$  generation, the cross being between two varieties of *Nicotiana Tabacum*, which have among other contrasting characters differences in the weight of the seed. The seed produced by the  $F_1$  generation was separated into various grades according to weight by an improved "grader." On the basis of weight twenty-two grades were made, ranging in weight per hundred seeds from 0.0041 to 0.0111 grams.

The data show a marked correlation of heavy seed with the vegetative characters of the original parent having the heavier seed, and of light seed with the characters of the other parent. In other words the fluctuations in the weight of the seed produced by the  $F_1$  generation are correlated with certain fluctuations in the vegetative characters of the  $F_2$  generation. The heavy seed germinated more quickly and gave seedlings that were at the start more vigorous, but as the season advanced a larger percentage of plants matured from the seedlings derived from the light and medium weight seed. It is pointed out that these studies indicate that in investigating the heredity of plants greater attention should be paid to the physical characteristics

\* University of California Publications in Botany, Vol. 5, Nos. 2 and 3.

of the seed, that if possible all types and grades of seed should be germinated, and that seedlings showing all degrees of vigor should be grown to maturity, since variation in seed size, etc., is a direct suggestion of the possible segregation of the original characters.

A second part of the report treats of the "quantitative expression of imperfect dominance in the corolla diameters of the flowers on the hybrids produced from three varieties of *Nicotiana acuminata*." These three varieties differ only in regard to the diameter of the open corolla, a feature which is practically constant for each variety giving an average for the varieties of 13 mm., 20 mm. and 27 mm. with fluctuations never greater than 2 mm. more or less than the mean for any one variety.

Measurements were made of the corollas on five groups of hybrids between these varieties. In every group the average of the measurements was intermediate between the average corolla diameters of the respective parents. The fluctuations, however, in the  $F_1$  plants of all the hybrid groups taken together was from 13 mm. to 30 mm. or as great as the extremes exhibited by the parents. The fluctuation, however, within a single group was almost twice as great as the greatest fluctuation in any of the parental varieties.

In a later paper Dr. Goodspeed gives a preliminary report on the  $F_2$  hybrids of these same forms grown during the summer of 1912. In these still greater fluctuation appeared. For example, of the  $F_2$  plants of the cross "III ♀  $\times$  II ♂" (small flowered variety  $\times$  variety with corollas of intermediate size) every one bore "flowers smaller than the smallest ever measured on the small-flowered parental variety III, and every plant also bears flowers larger, with possibly one exception, than the largest flowers measured, on variety II in 1900 and 1911." The data thus exhibit cases of hybridization which produce in the  $F_1$  and  $F_2$  generation greater degree of fluctuation than was seen in the parents.

The author states that "a sample monohybrid ratio was anticipated for the results of the measurements of corolla diameter of flowers on  $F_2$  individuals," but that the results do not admit of any handy or helpful interpretation by the Mendelian notation.

The author discusses the "present status of the unit character conception" in a fashion both suggestive and stimulating. It is pointed out that, on the multiple factor hypothesis, the assumption of complexity in the germ plasm can be extended so as to interpret in Mendelian formulae any degree of variation, but the question whether the "end justifies such means" is raised.

The results of this investigation and the discussion which is given are pertinent to the present situation. It is emphasized that there are hereditary phenomena that do not lend themselves to a Mendelian notation in any way that is helpful from a practical point of view or even theoretically illuminating. It is an indication of the growing reaction against the extremely speculative character which the Mendelian notation has been given in the "presence and absence" and "multiple factor" hypotheses.

Meanwhile we must await a more intensive analysis of characters which are now considered qualitative as well as those which are clearly quantitative. The great service which Mendel contributed to the study of genetics in focusing attention on single characters, may through such studies reach fruition.

A. B. STOUT

## PROCEEDINGS OF THE CLUB

JANUARY 14, 1913

The annual meeting of the Club for 1913 was held at the American Museum of Natural History at 8:15 P.M. President Burgess presided. Twenty-five members were present.

The minutes of December 10 were read by Dr. A. Hollick and were approved as read.

J. K. Henry, 2024 Beach Ave., Vancouver, B. C., and F. W. Pennell, Wawa, Pa., were proposed for membership in the Club.

The reports of the various officers were then presented. The treasurer's report was referred to an auditing committee consisting of Dr. J. H. Barnhart and Prof. R. A. Harper, appointed by the president.

The secretary reported that fourteen meetings had been held during the year, with a total attendance of 271 and an average